



**National
Transportation
Safety Board**

Transportation Safety and Sleep Medicine: The NTSB Perspective

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Federal Agencies: Transportation

NTSB

FMCSA

FRA

NHTSA

PHMSA

DOT

MARAD

FTA

FHWA

FAA



NTSB



NTSB



- 1) determining the probable cause of transportation accidents
- 2) making recommendations to prevent their recurrence



NTSB



All Modes



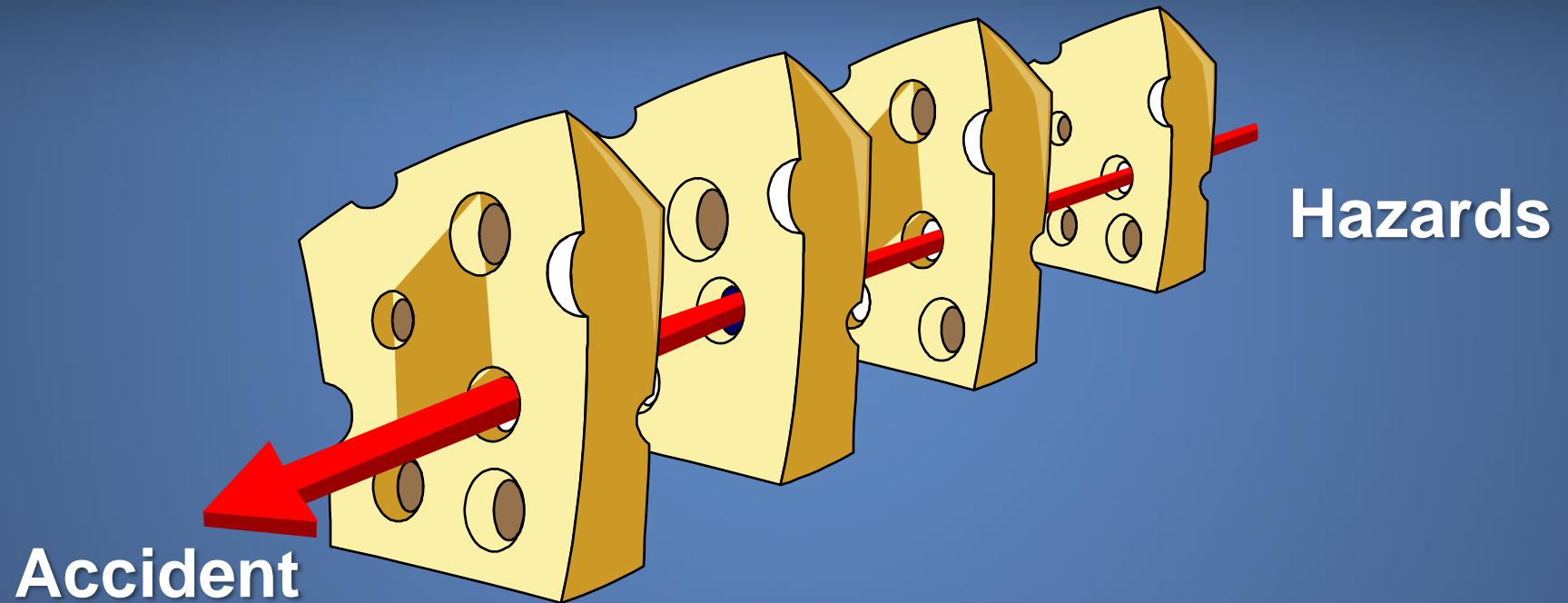
NTSB

Independent Federal Agency: Created in 1967

- >132,000 accident investigations
- 13,500+ safety recommendations
- ~ 2,500 organizations/recipients
- 82% acceptance rate



“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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Four Fatigue Factors +

- Sleep loss
- Continuous hours of wakefulness
- Circadian/time of day
- Sleep disorders
- Other considerations



Guantanamo Bay Cuba

First NTSB aviation accident to
cite fatigue as probable cause

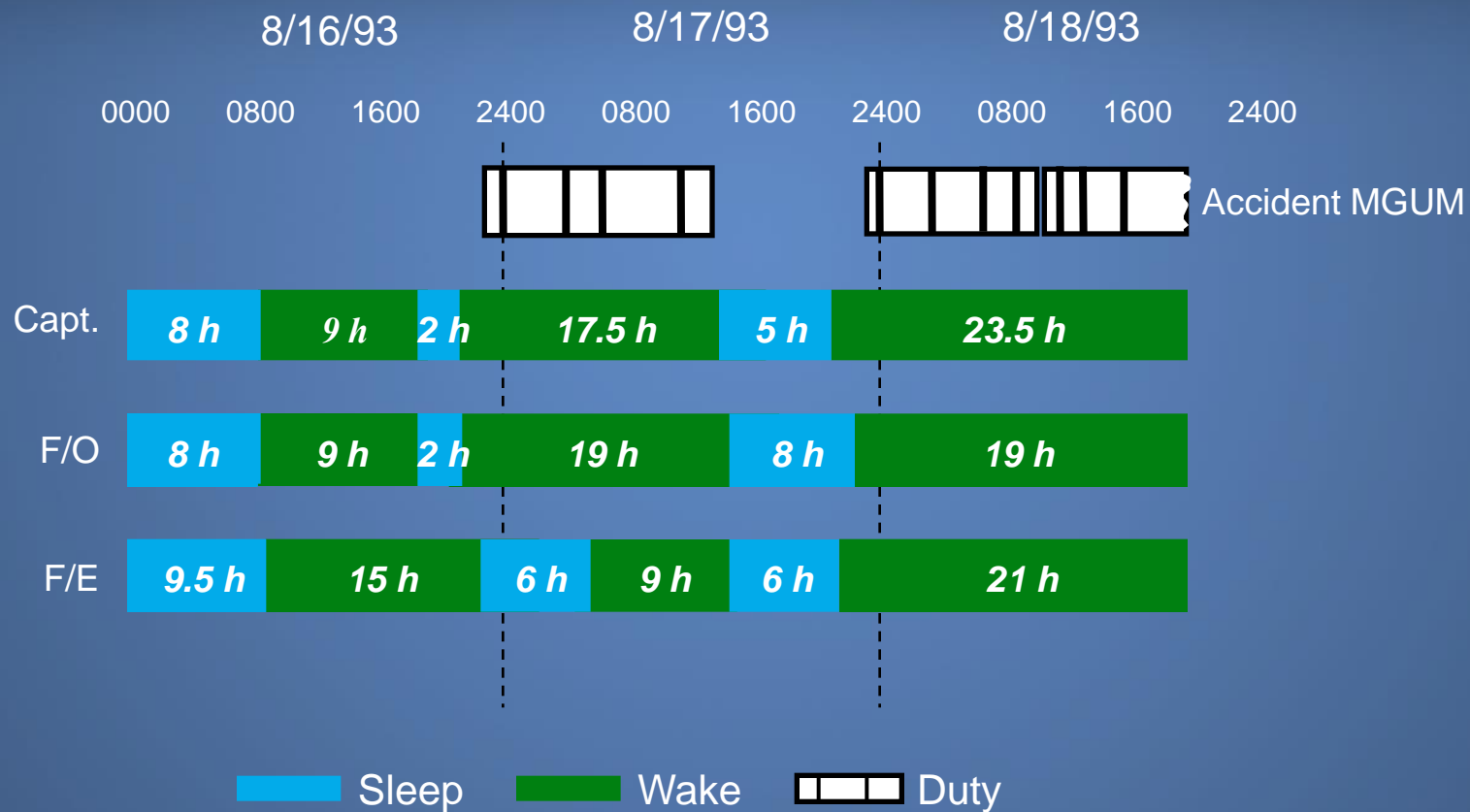


- acute sleep loss, sleep debt, circadian disruption



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Crew Sleep History



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Observed Performance Effects

- Degraded decision-making
- Visual/cognitive fixation
- Poor communication/coordination
- Slowed reaction time





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Uncontrolled In-Flight Collision with Terrain
AIA Flight 808, Douglas DC-8-61, N814CK
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

“The National Transportation Safety Board determines that the probable causes of this accident were the impaired judgment, decision making, and flying abilities of the captain and flight crew due to the effects of fatigue...”



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Miami, Oklahoma (June 26, 2009)

Fatigue Factors

- Off work for 3 weeks: day active/night sleep schedule
- 3am to 3pm shift work/drive schedule (since 1997)
- Early bedtime (2 hr phase advance in sleep time)
- Obtained min 3 hrs/max 5 hrs sleep prior to accident
- Subsequently diagnosed with mild sleep apnea



10 fatalities
3 serious injuries
2 minor injuries
5 no injuries

**Ford
Windstar**



**Hyundai
Sonata**

**Kia
Spectra**

Source: Oklahoma State Police

Probable Cause (fatigue)

“ . . . driver’s fatigue, caused by the combined effects of acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea, which resulted in the driver’s failure to react to slowing and stopped traffic ahead by applying the brakes or performing any evasive maneuver to avoid colliding with the traffic queue. . . . ”





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Track Path Animation

Collision Between Two BNSF Railway Freight Trains

Red Oak, Iowa

April 17, 2011

DCA11FR002



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Probable Cause (fatigue)

“ . . . failure of the crew of the striking train to comply with the signal indication requiring them to operate in accordance with restricted speed requirements and stop short of the standing train because they had fallen asleep due to fatigue resulting from their irregular work schedules and their medical conditions.”





National Transportation Safety Board

Animation of Accident Reconstruction

Motorcoach Run Off Road-Collision with Bridge Signpost

Interstate Highway 95 Southbound
New York, New York
March 12, 2011

HWY11MH005

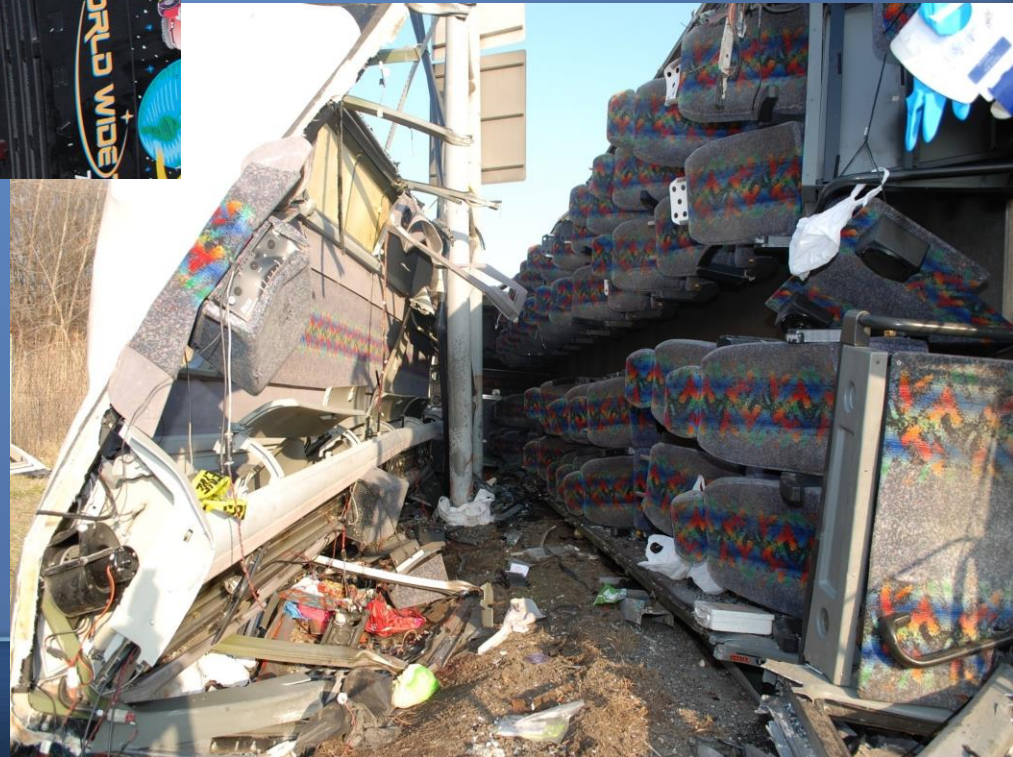


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'Bronx Bus', New York, NY (March 12, 2011)



15 fatalities
17 injuries



Probable Cause

“The National Transportation Safety Board determines that the probable cause of the accident was the motorcoach driver's failure to control the motorcoach due to fatigue resulting from failure to obtain adequate sleep, poor sleep quality, and the time of day at which the accident occurred.”



Asiana 214 (July 6, 2013)

San Francisco, CA (SFO)



3 fatalities
49 seriously injured



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Probable Cause

Contributing to the accident were . . .

(5) flight crew fatigue, which likely degraded their performance.





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MOST WANTED LIST

A program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. The following are ten of the current issues.



Addressing Human
Fatigue



General Aviation
Safety



Safety Management
Systems



Runway Safety



Bus Occupant Safety



Pilot & Air Traffic
Controller
Professionalism



Recorders



Teen Driver Safety



Addressing Alcohol-
Impaired Driving



Motorcycle Safety



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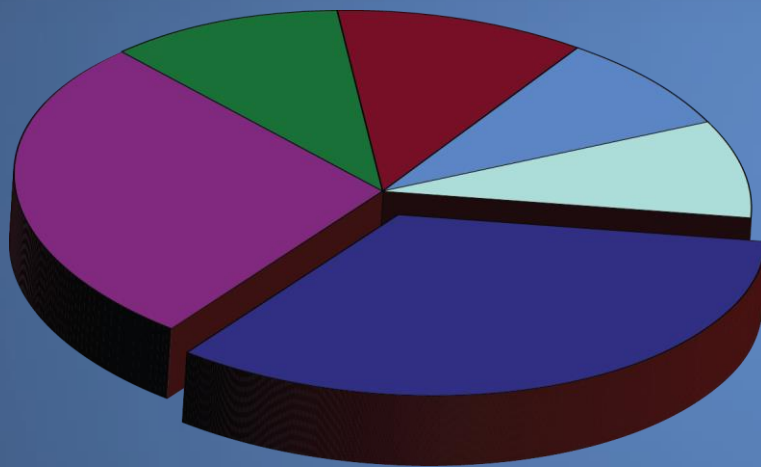
NTSB Recommendations

- MOST WANTED 1990 - 2011
- >200 fatigue recommendations



Complex Issue:

Requires Multiple Solutions



- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation



NTSB Fatigue Recommendations: Education/Strategies

- Develop a fatigue education and countermeasures training program
- Educate operators and schedulers
- Include information on use of strategies: naps, caffeine, etc.
- Review and update materials



Scheduling Policies and Practices

Victoria, Texas, January 2, 2008



Victoria, Texas Fire Department

- Day sleep, night drive, ~ 4 am WOCL



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NTSB Fatigue Recommendations: Hours of Service / Scheduling

- Science-based hours of service
- Allow for at least 8 hours of uninterrupted sleep
- Fatigue mitigation strategies in the hours-of-service regulations for passenger-carrying drivers who operate during the nighttime window of circadian low
- Reduce schedule irregularity and unpredictability



Sleep Apnea

Mexican Hat, UT, January 6, 2008



- 360 rollover, 50/53 ejected, 9 fatalities, OSA (-CPAP)



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NTSB Fatigue Recommendations: Sleep Apnea/Health Related

- Develop standard medical exam to screen for sleep disorders; require its use
- Educate companies and individuals about sleep disorder detection and treatment, and the sedating effects of certain drugs
- Ensure drivers with apnea are effectively treated before granting unrestricted medical certification



Go! Flight 1002



- early starts, multiple segment days, sleep apnea



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1. modify the Application for Airman Medical Certificate to elicit specific information about any previous diagnosis of obstructive sleep apnea and about the presence of specific risk factors for that disorder (A-09-61)
2. implement a program to identify pilots at high risk for obstructive sleep apnea and require that those pilots provide evidence through the medical certification process of having been appropriately evaluated and, if treatment is needed, effectively treated for that disorder before being granted unrestricted medical certification (A-09-62)
3. develop and disseminate guidance for pilots, employers, and physicians regarding the identification and treatment of individuals at high risk of obstructive sleep apnea, emphasizing that pilots who have obstructive sleep apnea that is effectively treated are routinely approved for continued medical certification (A-09-63)



Success requires . . .

A culture change that supports
different attitudes and behaviors



Manage Sleep = Enhance Safety

- Promote culture change
- Educate everyone
- Strong policies
- Acknowledge risks
- Take action!



Good sleep, safe travels.



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